

REMARKS

I. Status of the Application

Claims 12-20 are pending in this application. Claims 12-20 have been rejected. In the May 2, 2006 office action, the Examiner:

- A. Objected to claims 12-20 because of informalities; and
- B. Rejected claims 12, 16-20 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 5,943,598 to Lin (hereinafter “Lin”) and U.S. Patent No 6,239,491 to Pasch et al., in further view of U.S. Patent No. 6,064,119 to Jun et al (hereinafter “Jun”).
- C. Rejected claims 13-15 under 35 U.S.C. § 103(a) as being unpatentable over Lin, Pasch and Jun as applied to claim 12 above, and further in view of U.S. Patent No. 6,830,966 to Cai et al.

In this Response, applicants have amended claim 12 to further clarify the claimed invention. Applicants respectfully traverse the rejection of the pending claims and request consideration of the application in view of the amendments and the ensuing remarks.

I. The Objections to the Claims Should be Withdrawn

The Examiner objected to claim 12 because of two inadvertent errors. In particular, the Examiner noted that the element “a recess” was recited twice, thereby raising an antecedent basis issue. Applicants have amended claim 12 to clearly claim a “first recess” and a “second recess”. This change is not intended to change the scope of claim 12 and

merely clarifies that which was originally claimed. Accordingly, the objection has been addressed.

The other error noted by the Examiner arose from recitation at line 15 of claim 12 of the element "first dielectric layer". In particular, the Examiner correctly noted that the "first dielectric layer" lacked an antecedent basis. Applicants have addressed this error by amending claim 12, line 15 to replace "first dielectric layer" with "first insulating layer", reflecting the original intention of the claim. The term "first insulating layer" has an antecedent basis on line 5 of claim 12.

As a consequence, it is respectfully submitted that the Examiner's objections to the claims have been addressed, and should now be withdrawn.

II. The Rejection of Claims 12 Over Lin, Pasch and Jun

The Examiner has rejected claim 12 as allegedly being obvious over a combination of three references, Lin, Pasch and Jun. As will be discussed below in detail, however, there is no motivation to combine Pasch with Lin, as proposed by the Examiner, and no motivation to combine Jun with Pasch and Lin, as proposed by the Examiner. Thus, for two independent reasons, it is respectfully submitted that the obviousness rejection of claim 12 should be withdrawn.

A. The Combination of Lin and Pasch

There is no motivation or suggestion to combine Lin and Pasch as proposed by the Examiner. This combination is necessary to sustain the rejection of claim 12.

The Examiner cited Lin as a primary reference against claim 12, stating that Lin

disclosed a first insulating layer (element 28 of Figs. 2a-2c of Lin), a second insulating layer (element 38), a contact via (element 30d) filled with a first conductive material (32d).

According to the Examiner, Lin also discloses a recess (40c) penetrating the second insulating layer (38) and extending into the first conductive material 32d and the first insulating layer.

The Examiner admitted that Lin failed to teach, among other things, a “recess [that] extends to the second terminal surface through the first and second insulating layers, and is filled with a third conductive material”, as called for in claim 12. (May 2, 2006 office action at pp.3-4)

To address this deficiency of Lin, the Examiner alleges that “it would have been obvious . . . to modify the device of Lin to include a recess, filled with conductive material, extending to the second terminal through the first and second insulating layers, as taught by Pasch, for the disclosed intended purpose of forming vias with the same diameter though both insulating layers . . .” (May 2, 2006 office action at p.4).

However, Lin teaches that the first and second terminals 14b and 14c are *already* electrically connected to each other and to a metal layer 42 by polystructures 32d and 32e. (Lin at Figs. 2b and 2c). The polystructures 32d and 32e are connected to the metal layer 42 through metal material extending through a “recess 40b” formed in the second conductive layer of Lin. (*Id.*) Because both polystructures 32b and 32e already connect to the metal layer 42 and to the first and second terminals 14b and 14c, there would be no reason to include a recess that “extends to the second terminal surface through the first and second insulating layers, and is filled with a third conductive material”.

In other words, while recess 30e of Lin (see *id.* at Fig. 2a) does extend through the first insualtion layer 28 of Lin, there is no reason to extend the recess 30e all of the way through the second insulating surface 38. Indeed, it would be difficult to extend the recess 30e

through the second insulating surface 38 of Lin because the recess 30e is created before the creation of the second insulation layer 38. (See *id.* at Figs. 2a and 2b)

Thus, the extension the recess 30e (or addition of another recess) through the second insulating layer 38 of Lin (and subsequently filling that recess), as proposed by the Examiner, would require additional processing that is currently not required to construct the device of Lin. At a minimum, it would make the structure more complex by adding a feature that is not needed.

As a consequence, because extending the “second recess” of Lin through the second insulating layer would not create any advantage over the existing structure of Lin, it is respectfully submitted that there is no motivation or suggestion to modify Lin as proposed by the Examiner. For at least this reason, it is respectfully submitted that the obviousness rejection of claim 12 is in error and should be withdrawn.

B. The Combination of Lin, Pasch and Jun

The Examiner also admitted that the combination of Lin and Pasch did not teach or suggest a structure wherein the second conductive material contacts the first conductive material on a top surface *and on a portion of a side surface thereof.*

The Examiner alleges that it would have been obvious to modify Lin and Pasch to have the second conductive material contact the first conductive material on a top surface and on a portion of a side surface thereof. The Examiner alleges that the purpose of such a modification would be to provide a wiring structure capable of minimizing the area of a conductive wire exposed through a misaligned contact hole...” (May 2, 2006 office action at p.5).

Applicants respectfully disagree that such a modification of the interface of the first conductive material of Lin and the second conductive material of Lin would “minimize the area of conductive wire exposed through a misaligned contact hole....” Lin has a structure that is not vulnerable to misalignment of the relevant contact hole. To this end, the second conductive material of Lin, which is metal layer 42, contacts a relatively large top surface of the first conductive material of Lin, which is the combination of the polystructures 32d, 32e and the poly interconnect portion. (See Lin at Figs. 2b and 2c). There does not appear to be any danger of exposing the second conductive material (metal 42) because the contacting portion of the 42 is so much smaller than the top surface (poly interconnecting portion) of the first conductive material as shown in Figs. 2b and 2c.

Moreover, it is generally difficult to conceive how the semiconductor circuit of Lin could be modified to include this feature of Jun.

For the foregoing reasons, it is respectfully submitted that one of ordinary skill in the art would not be motivated to modify the proposed combination of Lin and Pasch to such that the material 42 of Lin contacts a portion of a side surface of the poly interconnect between poly structures 32d and 32e of Lin because such a modification would address a problem that does not appear to exist in Lin – the problem of a misaligned hole to the poly interconnect. In particular, because the poly interconnect of Lin is so large compared to the connection portion of the material 42 of Lin, precise alignment is not required and misalignment is not an issue.

As a consequence, it is respectfully submitted that the Examiner has not set forth a legally sufficient motivation or suggestion to modify the proposed combination of Pasch and Lin as proposed. For at least this reason, the rejection of claim 12 over Lin, Pasch and Jun should be withdrawn.

IV. Rejection of Claims 13-20 Under
35 U.S.C. § 103(a) Should be Withdrawn

Claims 13-20 all stand rejected as allegedly being unpatentable over combinations of prior art that all include Lin, Pasch and Jun. Claims 13-20 all depend from and incorporate the limitations of claim 12. As discussed above in connection with claim 12, the Examiner has failed to set forth a legally sufficient motivation or suggestion to combine Lin, Pasch and Jun as proposed. Accordingly, for at least the same reasons as those set forth above in connection with claim 12, it is respectfully submitted that the obviousness rejection of claims 13-20 should be withdrawn.

V. Conclusion

For the foregoing reasons, it is respectfully submitted that Applicants have made a patentable contribution to the art. Favorable reconsideration and allowance of the application is earnestly solicited.

Respectfully Submitted,



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August 2, 2006